This leaflet will provide you with information about chronic kidney disease – mineral bone disorder (CKD-MBD) and how to look after the health of your bones when you have chronic kidney disease.

**How does having chronic kidney disease affect my bones?**

CKD-MBD affects most people with kidney disease. This includes people in the “low clearance” clinic, those who are treated with dialysis and those who have had a kidney transplant.

CKD-MBD occurs when the levels of some minerals and hormones in your body become difficult to control. These include calcium, phosphate, vitamin D and parathyroid hormone (PTH).

**How will my bone health be monitored?**

Your kidney doctor or nurse will arrange for you to have regular blood tests. These can help us identify any blood levels which are out of range (see table on page 5) and organise treatment, if needed. This can help reduce your risk of developing serious problems with your bones.

It is unlikely you will experience any symptoms, unless you have advanced CKD-MBD. In advanced CKD-MBD, you may have damage to your bones that never goes away completely.
Why are calcium, phosphate, vitamin D and PTH important?

These help to maintain healthy bones in the body.

**Calcium**

Calcium provides bone strength. It is carried around in the blood and the levels are carefully controlled by the body. Calcium enters the body from the food you eat and is found in dairy products, green vegetables and eggs.

With chronic kidney disease, your kidneys are unable to make active vitamin D; this is needed to control the amount of calcium that you absorb from your food. Your kidney doctor or nurse may prescribe you active vitamin D supplements.

**Phosphate**

Phosphate is one of the minerals that helps to maintain strong bones and gives strength to your muscles. It is carried around in your blood. You get phosphate from your food, mainly from dairy products, nuts and meat.

Your kidneys are responsible for removing excess phosphate from your body. As your kidney function declines, phosphate levels increase in your body. Your kidney team will advise you to reduce the amount of phosphate-rich foods in your diet and may prescribe medication to help lower your phosphate levels.

**Vitamin D**

Healthy kidneys activate vitamin D into a form that helps your body absorb calcium from your food. It is more difficult to produce the activated form of vitamin D when you have chronic kidney disease. Your kidney doctor may recommend that you have your vitamin D level measured. This involves taking a small sample of blood; this is usually taken with other blood samples.
**Parathyroid hormone**

Parathyroid hormone (PTH) is a hormone (chemical messenger) that helps control the level of calcium in your blood. PTH comes from the four small parathyroid glands in your neck, behind your thyroid gland. If your calcium level falls, the parathyroid glands produce more PTH to keep the calcium levels normal.

In chronic kidney disease, the parathyroid glands need to work harder to try and control calcium levels in your blood. This is called **hyperparathyroidism**. Treating hyperparathyroidism is complex. It involves ensuring your phosphate and calcium levels are maintained in the recommended range and that you are on the correct dose of active vitamin D. Your kidney doctor will discuss this with you.

A high PTH level can make your bones weaker. If left untreated, the parathyroid glands can become overactive and be difficult to control. Your kidney doctor may recommend a medication (cinacalcet) to help control the level of calcium in your blood. There is a separate leaflet available on cinacalcet, please ask your kidney team if you would like a copy.

Occasionally, an operation is needed to remove the parathyroid glands; this is called a **parathyroidectomy**. Your kidney doctor will talk to you more about this, if it is needed.
Recommended blood levels of calcium, phosphate and PTH for people with chronic kidney disease

<table>
<thead>
<tr>
<th>Mineral or hormone</th>
<th>On dialysis</th>
<th>Not on dialysis (your levels may vary depending on the stage of your kidney disease)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected calcium (this is the most accurate way of measuring your calcium levels)</td>
<td>2.2 - 2.5mmol/L</td>
<td>2.2 - 2.5mmol/L</td>
</tr>
<tr>
<td>Phosphate</td>
<td>1.1 - 1.7mmol/L</td>
<td>0.9 - 1.5mmol/L</td>
</tr>
<tr>
<td>Parathyroid hormone (PTH)</td>
<td>14 - 63pmol/L</td>
<td>Less than 20pmol/L</td>
</tr>
</tbody>
</table>
What symptoms may I experience if I have CKD-MBD?

**Common symptoms**
- itching (this could be anywhere over your body)

**Rarer symptoms**
- bone pain (especially around your shoulder and hip joints)
- swollen joints (such as fingers and toes) due to calcium deposits
- tingling in your lips and fingers, twitching and spasms, especially in your face and arms (usually caused by low calcium level)
- muscle weakness
- gritty, bloodshot eyes.

**Other problems you may experience**
- increased risk of heart disease and strokes (the excess phosphate and calcium can be deposited in tissues and blood vessels)
- increased risk of bone fracture
- severe skin wounds that are very difficult to heal. This rare but serious condition is known as calciphylaxis (please see the ‘What is calciphylaxis?’ leaflet for more information).
How can I help to protect my bones?

The following is a list of ways to help your CKD-MBD.

- **Diet**: You will need to reduce the amount of phosphate you eat.
  
  Phosphate is found in dairy products, eggs, cheese, nuts and a number of other foods. Renal dietitians can offer support and advice about eating less phosphate within a balanced renal diet.

- **Phosphate binders**: These are medications that bind to the phosphate in your food and decrease the amount of phosphate absorbed into your body each time you eat. Your body can then get rid of the phosphate each time you open your bowels.
  
  There are many different types of phosphate binder available and your kidney team will look at all of your blood results to discuss which phosphate binder is best for you.

- **Vitamin D**: You will need to take an activated form of vitamin D supplement (alfacalcidol). You cannot buy activated vitamin D over the counter.

What happens if I have had a kidney transplant?

A successful kidney transplant improves mineral and hormone levels, but it may not fully reverse previous bone damage. You may need to continue some medications after your transplant.
Further information

**Oxford Kidney Unit**
Website: www.ouh.nhs.uk/oku/
The OKU website has lots more information for patients, relatives and friends.

**British Kidney Patient Association**
www.britishkidney-pa.co.uk/images/downloads/patient_information_leaflets/BKPA-CKD-MBD.pdf

How to contact us

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If you have a specific requirement, need an interpreter, a document in Easy Read, another language, large print, Braille or audio version, please call 01865 221 473 or email PALS@ouh.nhs.uk